Anycast vs Unicast
What a Global Business Needs to Know
In today’s online marketplace, global businesses must make sure their customers around the world can access their content, applications, and data whenever and wherever they need them. One of the best ways to provide 100% uptime and high performance is by integrating **anycast** routing into your infrastructure.

**What is Anycast?**

The easiest way to understand how anycast routing works is to compare it to the much more commonly-used unicast routing. When running a business with customers located in many different places, be it across the United States or around the world, knowing the difference can help you understand which architecture would be best for your reliability and performance needs.

**Unicast: One IP, One Server, One Location**

**A Simple, Commonly-Used Architecture**

Because it is easier and inexpensive to implement, much of the Internet today is configured using unicast routing. The Internet is made of interconnected nodes – physical devices, often servers, that are able to send, receive, and forward the information sent to it. IP addresses are identifying numbers (and letters with IPv6) that tell the network where to find a node. With unicast, one IP address is mapped to one node that physically resides in one location.

Setting up unicast is very straightforward, because the IP address only needs to resolve to the one environment where your content, data, and applications are stored. Ensuring just one server is up, running, and available is much easier than maintaining multiple locations.

When you are connecting from one node (for example, your laptop) to another, such as a web server, routers will use their internal "map" to determine the shortest path to get from one device to the other. Routers send data sets, known as packets, to other routers that in turn send the same packet to other routers until the packet finally arrives at the server broadcasting the IP address. Each of these packet hand-offs are known as hops.
With unicast, no matter where you are in the world, the last hop will always be to the same physical location. If your server is located in New York and is setup with unicast, a customer in New Jersey will have many fewer hops in their route to your server than a customer in Hong Kong will. Because of this, the New Jersey customer will always have a much faster and more reliable experience than the Hong Kong customer will.

**Downsides and Risks**

Although unicast is by far the easiest to set up, it is not always the fastest, most secure, or most reliable. If you’ve ever seen an error message that your IP address is already in use when trying to connect to a network, or that an IP wasn’t available when you were trying to connect to it, you’ve experienced some of the limitations of unicast.

Performance can be highly variable with unicast, depending on where your users are located. If you have customers and business partners accessing your content from all across the country or the world, only the ones physically closest to your server’s location will experience the best performance.

Unicast is also more prone to downtime and outages, because there is no redundancy in place if your server goes offline, even if just for routine maintenance. If your server fails or needs to be upgraded, your data and applications will be unavailable until the server is brought back online.

Most seriously, unicast is very vulnerable to DDoS (distributed denial of service) attacks. A DDoS attack generates an overwhelming amount of web traffic and directs it at one server, overloading its resources and causing it to fail. The data and applications on your server will be unavailable until the attack is over – and often long after, as your system recovers.

**Anycast: One IP, Many Servers, Many Locations**

**A Robust, Distributed Solution**

An alternative to unicast architecture is anycast routing, which is often a good fit for businesses with customers across large geographic areas, such as the East Coast and West Coast of the United States, or across Europe and Asia.

Anycast allows multiple servers to become accessible from a single IP address. This is done by using a specific configuration of global Internet routing known as the Border Gateway Protocol or BGP. Once it is properly set up, you can have as many servers in as many locations as you need – all accessible from a single IP address, such as 172.16.254.1 (IPv4), or 2001:0db8:85a3:0000:0000:8a2e:0370:7334 (IPv6).

Some well-known IP addresses include Google's 8.8.8.8, and Cloudflare's 1.1.1.1, which both serve as public DNS services that help people browse the web faster and more quickly.
**Improved Performance**

If you have servers all around the world that are anycasted, the number of hops your customer's requests have to take to access your content and applications will go down dramatically. You could have a customer in China's request sent to a Hong Kong datacenter, while a customer in New Jersey's request could go to a datacenter in New York City. Anycast will significantly improve your customer's experience by ensuring they are always being served by the location physically closest to them.

You can also use anycast to improve performance on internal network architectures, not just Internet-based platforms. Even better, anycast routing is possible on both IPv4 and IPv6 networks.

With unicast routing, users geographically further from your server will experience slower performance. When anycast routing is used, customers experience lower latency by connecting to the server that is physically closest to them.

**Seamless Failover**

When you have multiple servers "sitting" behind one IP address with anycast, you can ensure your content and applications will always be available, 100% of the time.

Let's say your business has 10 locations around the United States, and each location is unicasted. Then, the New York location experiences a failure and goes offline. In this scenario, your service in that region would be offline and a user in New Jersey would have to wait until the physical server is restored and brought back online.
Now let’s say your 10 locations around the United States utilize anycast and are accessible by one IP address. When the New York location fails, your customer in New Jersey will be quickly redirected to a server in Virginia, adding only a few milliseconds of access time, instead of leaving them frustrated and waiting, possibly hours or even days, for the New York server to be repaired.

**Security**

Because your content is available from multiple servers in multiple locations, anycast will protect your network from DDoS attacks. In a DDoS attack originating from one location, malicious users will try to overload one of your servers. With anycast, even a successful attack of this type would only take one location offline, leaving your other locations available and ready.

If a DDoS attack comes from multiple areas, their traffic will be distributed among all of your locations equally, thereby reducing the chance that any one of your servers will go offline. For an additional level of protection, anycast can also be configured to work with services from leading DDoS mitigation service providers, including Prolexic and Arbor Networks.
Downsides of Anycast

While there are many benefits of anycast, one big downside of deploying your own anycast infrastructure is cost. The price of installing your servers in highly secure, well-connected, datacenters across the world can be daunting. You’ll end up juggling and paying for multiple datacenter operators, connectivity providers, and network technicians.

On top of all that, you have the cost of monitoring and troubleshooting each location, and ensuring each one is online and available – and that’s just to make sure the infrastructure is ready, without including the cost of a network expert to configure, monitor, and optimize your anycast routing.

A Flexible, Reliable Anycast Provider

One way to both minimize those costs, and get all the benefits of anycast is by partnering with a provider like NetActuate for routing and infrastructure.

With our anycast service, you can make your content and applications available via our global network of over 32 locations. You can deploy your infrastructure on our shared or dedicated virtual servers, or collocate your equipment in our world-class datacenters.

We also support anycast routing into commonly-used public cloud providers such as AWS, Google and Azure, as well any servers you have in your own datacenters.

If you have customers across the United States and even around the world, demanding high performance and zero downtime, an anycast routing solution could be a great fit for you.
A Simple, No-Hassle Monthly Fee

The best part is that all of these services are bundled into one, simple monthly price, so you don't have to juggle multiple vendors. Your business can not only leverage our global infrastructure, you will also be supported 24x7 by our team of experts, who are continually monitoring and optimizing our connections for maximum speed and reliability.

If you have customers across the United States and even around the world, demanding high performance and zero downtime, an anycast routing solution could be a great fit for you. If you’d like to learn more, reach out to us today to be connected to a Solution Specialist at netactuate.com or at +1.800.419.COLO (2656).

NetActuate’s Anycast-Ready Global Locations

Learn more about anycast today at: netactuate.com/anycast